Earned Value Management

PUTTING EVM TO THE TEST

TALK TO ANY PROJECT MANAGER IN INDUSTRY OR GOVERNMENT AND YOU'LL FIND THAT TWO OF THE MOST COMMON COMPLAINTS ARE COST AND SCHEDULE OVERRUNS.

BY JERALD KERBY AND STACY COUNTS

IN MANY INSTANCES THERE IS NO FOREWARNING; SCHEDULES slip, costs soar, and the project manager is faced with the near impossible task of explaining why each impact occurred. With contractors performing the majority of the work, the management job can become even more obscure. The simple lack of proximity to the contractor can limit effective communication. Add to that a mixture of cultural differences and a desire for the contractor to portray the most optimistic view of their performance, and you create an even more difficult task for the project manager.

This was the scenario when the Habitat Holding Rack (HHR) manager at Marshall Space Flight Center (MSFC), Stacy Counts, was introduced to the overall concept of Earned Value Management (EVM). Faced with increased costs (which eventually resulted in decreased scope of the project), continued schedule slides, and several technical anomalies, she was looking for a way to gain a better handle on the project performance.

As a component of the Space Station Biological Research Program (SSBRP), the HHR project is an integral piece of the Program content. The HHR is the first rack hardware to be delivered for the Program and has therefore been the first rack to move through the trials of test and verification—documenting anomalies and technical difficulties that will benefit the other SSBRP rack projects. For these reasons, the HHR maintained high visibility throughout the manufacturing and assembly process, continuing through test and verification activities. Needless to say, the higher visibility emphasized the need for improved performance on this project. And to improve project performance, Stacy first had to figure out how to measure the cost, schedule and technical objectives effectively.

Enter the concepts of Earned Value Management

As the principle center for EVM, MSFC was fortunate to have a group of experts—Jerald Kerby among them—whose knowledge of EVM was substantial, and who were willing to work with Stacy to apply the principles of EVM to her project. The overall goal was first to understand performance and better deal with the current overrun environment.

Second, EVM would be implemented to improve the ways of managing cost and schedule concerns, and to plan ahead for future impacts that might result from the current situation. The process helps to measure performance in cost, schedule, and technical areas, and it would also help Stacy better identify her project risks. By measuring performance effectively and predicting a good percentage of issues/concerns upfront, mitigation plans could be put into place to help reduce or eliminate big impacts to the project.

The first step: determining the status of the project

Without an understanding of the current project status, there is no baseline from which to measure future evaluations. For a standard project that is in the early

WHAT IS EARNED VALUE MANAGEMENT [EVM]?

EVM is a process that has been used for years by government and industry projects, predominantly by the Department of Defense (DOD), to measure performance and health of the project. Government contractors use the process either as directed within the contract itself (currently NASA Policy Directive (NPD) 9501.3 but soon to be in NPR 7120.5C), or simply by choice. Unfortunately many projects never fully realize the potential of EVM and what it can do to help managers better understand the overall health of the project. EVM is not just a report! EVM is a tool that integrates the cost, schedule and technical requirements of a project. EVM also links these areas to the project's risk management process. EVM requires discipline in all aspects of the project; it requires that the organization performing the tasks plan the work and then work to that plan.

Obviously, some problems will occur that could not be predicted and therefore will not be a part of the initial plan; however, good initial planning followed by continual analysis and re-planning allows a manager to better mitigate issues and concerns that crop up. The use of EVM also helps the project manager in determining the current project status by answering questions such as: Are we on schedule? Are we on cost? Do the costs reflect the true accomplishments? What are our variances? EVM identifies trends that help a manager better predict where the project or a particular element is headed. EVM provides a method and data to establish a realistic Estimate At Completion (EAC) for the project. In essence, EVM gives personnel more reliable information to make better management decisions.

stages of design development, an Integrated Baseline Review (IBR) is held. Much like a Design Review, the IBR is a review used to understand the project's performance measurement baseline (PMB) and project objectives. The IBR also enables project personnel to understand the PMB in three areas: cost, schedule and technical performance. Based on this review, the project identifies and documents the risks associated with elements of the project so that mitigation plans can be developed for each.

But since the HHR Project was only two years from a completion date when Stacy came on board and recognized the need to use EVM, Jerald helped her to conduct a "mini-IBR," or a benchmark review. This helped them to assess the health of the project and to establish a more realistic PMB. The review was scheduled in such a way that it would not interfere with the contractor's regularly scheduled tasks.

The entire process went smoothly, and every effort was made to alleviate intrusions that would cause cost or schedule impacts in performing this review. Once the review was completed, the entire team had a much better vision of the remaining tasks, and individuals came away with a clearer picture of their piece in the overall project flow.

With contractors and government personnel working from the same baseline, the last step in the review was to come to documented agreement on remaining project objectives. The review resulted in a better-informed project team, and a group of people that learned to work together rather than having a "government versus contractor" mentality.

The second step: working with the schedule

In reviewing the PMB, schedule experts performed a review of the HHR schedules to ensure that good

network logic was in place and that all task dependencies in the schedule were linked accordingly. Personnel from the Project Analysis Office at MSFC worked with Stacy and her team to determine whether the time and resources associated with each task were appropriate. Once the schedules were reviewed, specific issues dealing with missing network logic and unlinked tasks were discussed, and actions were taken to update the schedules as needed.

During the schedule revisions the HHR team first realized the importance, and impact, of EVM. Although contractor personnel had established critical paths for every piece of the project schedule, an overall, high-level schedule did not exist to tie them together. Once a good schedule was developed for the overall project—linking all the major pieces of the project together—HHR personnel could better predict a date for completion of the work, as well as to develop a true critical path for the project. This schedule update also allowed for schedule changes to be added. These changes helped to identify clear critical paths for the project, and also helped the team to pinpoint an end-date which was tied to the impacts of those changes.

The third step: applying the review concepts

Good schedules certainly help to better plan a project in detail, but the implementation of that schedule is key to any project success. Once the initial review was complete—covering all functional areas of the

> "EVM gave me something to walk into a meeting with my contractors and speak to. I found that they would come in with their cost data and tend to put their best foot forward. I now have something substantial to back me up when I say, 'Your past performance says you're going to overrun—not only by what you're telling me, but probably by more.'"
>
> —STACY COUNTS

project—the HHR team began to use EVM to regularly manage the project.

The practice of EVM forced good planning by measuring work progress and providing the cost and schedule metrics to track project performance against the baseline plan. Using initial data, as well as each consecutive month's data as it was delivered by the contractor, the HHR manager could determine both cost and schedule variances and identify developing trends across the project's tasks.

The fourth step: continuous review of data

The primary data was submitted by the contractor via disk, loaded into a data analysis software tool (wInsight), and a 5-page summary report was printed for review with the contractor each month. This report was reviewed alongside the standard Cost Performance Report (CPR) that the contractor submits monthly. With constant access to EVM data, both the contractor and Stacy's team were able to see a realistic picture of where the project had been, where it was headed, and how fast it was likely to get there.

It works if you work it

EVM is a management process that has been embraced by project managers around the globe with good success. It allowed Stacy to define a PMB for the project that was more realistic than the previous baseline. It also provided her with the necessary data to track performance and to ably discuss project impacts with higher-level management. This was the data the project team needed

to back up that "gut" feeling that comes from years of project experience—experience that says you will almost always have schedule slips and cost overruns.

While EVM doesn't make the problems go away, when implemented properly it can help to identify problems before they reach their full potential. Today, project success is no longer an unattainable goal. By using EVM data to guide a project on a monthly basis, objectives can be more easily reached. With good tools, solid upfront planning, and effective implementation of these tools, project managers can be better informed to make management decisions during the entire life cycle of their project. •

LESSONS
• When all members of the project team—whether government or contractor—understand the objectives and work together from the same baseline, you are more likely to reach project success.
• The ability to track performance and cost and schedule variances gives the Project Manager the information they need for a preemptive strike to slips and overruns. That is, they don't have to operate on their "gut feeling" alone; they have the data as soon as a problem begins.

QUESTION
How can you change perceptions by introducing this tool to contractors as a benefit to the team, rather than a way of checking up on their performance?

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STACY COUNTS manages the International Space Station's Biological Research Project (BRP) Habitat Holding Rack (HHR). She credits the EVM tools available through the MSFC Chief Financial Office with helping her to establish a realistic approach to project planning, and a solid method for assessing the quality of contractor financial data.